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(54) **MANUFACTURE OF COLLAPSIBLE SAND CORE**

(57)Abstract:

PURPOSE: To obtain a sand core which can be coated sufficiently and is superior in collapsibility even when it is an original mold of the sand core solidified by means of the shell mold process.

CONSTITUTION: The original mold of the sand core for which RCS is solidified is acid-treated in such a manner as being immersed in an aqueous solution of dilute sulfuric acid, etc. This original mold of the sand core is rinsed with water after being heated and dried. Then, after it is treated with inorganic salt and dried, a uniform first coating is applied on the surface of the original mold of the sand core by immersing in the first coating liquid, etc. Then, a second coating is applied on the first coating in such a manner as immersing the mold in the second coating liquid containing aluminum powder. After it is dried again, a collapsible sand core is obtained.

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CLAIMS

[Claim(s)]

[Claim 1] the resin coated sand which coated carbolic-acid system synthetic resin --

using -- sand -- a core -- with the process which molds a pattern this sand -- a core -- the process which processes a pattern from an acid, and the sand which processed from this acid -- a core -- with the process which dries a pattern this dry sand -- a core -- the process which rinses a pattern, and this rinsed sand -- a core -- with the process which processes a pattern by mineral salt the sand processed by this mineral salt -- a core -- the process which dries a pattern, and this dry sand -- a core -- with the process which coats the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern this sand coated and obtained -- the process which dries a core, and this coated sand -- the process which coats a core with the 2nd coating agent of the shape of a slurry containing aluminium powder, and this sand coated and obtained -- the collapsibility sand which consists of a process which dries a core -- the manufacture approach of a core.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] the collapsibility sand which has the pressure-resistant and good coating nature which uses this invention at the time of high-pressure die casting of casts which have an undercut part, such as car motor closed deck type [for example,], and collapse ease -- it is related with the manufacture approach of a core. the sand molded in more detail using the sand for shell molds -- a core, while being able to coat the 1st coating agent only at once thickly by processing a pattern by the mineral acid, rinsing subsequently and processing by mineral salt further the sand which this coat layer was strongly made even if it coated the 2nd coating agent which contains aluminium powder on it, and moreover fitted high pressure casting excellent in the collapsibility after casting -- it is related with the manufacture approach of a core. coating nature good here -- sand -- a core -- a coating agent is thin in case a pattern is coated with a coating agent -- liquefied -- sand -- a core -- sand [without permeating the interior of prototypal deeply by the extended state] -- a core -- the ** which is not crawled from a prototypal front face -- sand -- a core -- a prototypal surface layer -- and on the whole surface predetermined thickness -- homogeneity -- and certain -- as it is formed firmly easily and it does not separate, it is that coating is carried out, and it is fully being able to bear the high-pressure cast pressure at the time of casting.
[0002]
[Description of the Prior Art] the case where casts which have the undercut parts of the cylinder crank case for automobiles closed deck type [for example,] or others, such as an aluminium alloy and a Magnesium alloy, are conventionally cast and manufactured with die casting -- collapsibility sand -- carrying out die casting using a core is performed. and collapsibility sand -- the case where a core is obtained -- first -- the form of a request of sand -- hardening -- next, the hardened sand -- a core -- a prototypal front face -- a coating agent -- applying -- the time of the molten metal cast under high pressure -- sand -- that a core is damaged **** -- a molten metal -- sand -- a core -- so that it may not invade inside the ** which carries out and hardly applies the force after casting -- sand -- it is tried to collapse a core, and to enable it to take out easily, and for sand to enable it to fully take out to all the corners. of course, that case -- sand -- a core -- although how to harden a prototypal component and sand, the component of a coating agent, the method of coating, etc. are variously tried from before, the present condition is that what may fully be satisfied is not obtained. In addition, as a coating agent, the 1st coating agent which consists of powder-like refractories and a metallic oxide, the 2nd coating agent containing aluminium powder, a mica, etc. of the shape of a scale applied on the 1st coating agent, etc. are used, for example as indicated by JP,63-40639,A.
[0003] the inside of it -- sand -- hardening -- sand -- a core -- there are ** hardox process, the ** worm box method, ** shell molding, a ** cold box process, etc. as an approach of acquiring a pattern. As a hardox process, the technique indicated by JP,64-9898,B is known, for example. and this approach -- setting -- sand -- a core -- the pattern consists of a binder which uses sand, acid hardenability resin, and an oxidizer as a principal component, and is hardened with a sulfur dioxide.
[0004]

[Problem(s) to be Solved by the Invention] the sand molded in the desired configuration in said hardox process -- hardening -- sand -- a core -- when acquiring a pattern, it hardens using a sulfur dioxide, i.e., a sulfur dioxide. Therefore, in order to use a sulfur dioxide, work environment is bad and use of gas which has a bad influence on the body is not liked at the works in Japan. moreover -- even if it uses a sulfur dioxide, in order not to have a bad influence on the body but to make it not worsen work environment, either -- installation of the ancillary facility for it -- very much -- coming out -- it is -- moreover, the installation and operation sake -- law -- regulation is also received.

[0005] Therefore, this invention person decided to improve the goodness of the shell molding which uses a binder instead of an oxidizer and a sulfur dioxide. shell molding -- the mixture of sand and a binder -- hardening -- sand -- a core -- the resin coated sand (RCS) which did not use a sulfur dioxide for acquiring a pattern, but coated carbolic-acid system synthetic resin, such as phenol resin, beforehand -- sand -- a core -- into the metal mold for pattern molding, it blows in by the compressed air, heat hardening is carried out, and it molds. however, the same coating agent as the coating agent currently performed quite good with said hardox process in this case -- sand -- a core -- even if applied to the pattern, it will crawl without a coating agent getting wet, and did not work.

[0006] on the other hand -- the artificer of the invention in this application -- RCS -- using -- shell molding -- using -- sand -- a core -- a pattern -- molding -- this sand -- a core -- the sand which dried it after processing a pattern by mineral acids, such as a rare sulfuric acid and phosphoric acid, -- a core -- coating the coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern, and drying it -- collapsibility sand -- patent application of the approach of obtaining a core was invented and carried out. the collapsibility sand obtained by this approach -- although a core is effective as it is -- the collapsibility sand of the molten metal at the time of high-pressure gouy KASUTO -- in order to lose the push in to a core more certainly, this coating was used as the 1st coating layer, and it tried to coat that front face with the 2nd coating agent containing aluminium powder as shown in said JP,63-40639,A carried out. However, good coating was not obtained in this combination. namely, sand -- a core -- the acid which remained near the prototypal front face penetrates the 1st coating layer, oozes even in the 2nd coating layer, and reacts with the aluminium powder which is a component in the 2nd coating agent. Consequently, the 2nd coating layer is bald or it separates.

[0007]

[Means for Solving the Problem] this invention -- setting -- RCS -- using -- sand -- a core -- the process which molds a pattern, and this sand -- a core -- with the process which processes a pattern from an acid the sand processed from this acid -- a core -- the process which dries a pattern, and this dry sand -- a core -- with the process which rinses a pattern this rinsed sand -- a core -- the process which processes a pattern by mineral salt, and the sand which processed by this mineral salt -- a core -- with the process which dries a pattern this dry sand -- a core -- with the process which coats the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern this sand coated and obtained -- the process which dries a core, and this coated sand -- the process which coats a core with the 2nd coating agent of the shape of a slurry containing aluminium powder, and this sand coated and obtained -- the process which dries a core -- collapsibility sand -- a core is obtained.

[0008] sand -- a core -- as an acid which processes a pattern, mineral acids, such as a sulfuric acid and phosphoric acid, are used, for example. moreover, sand -- a core -- being immersed into an acidic solution like a rare sulfuric acid, when processing a pattern from an acid **** -- an acidic solution -- sand -- a core -- brush coating is carried out on the surface of a pattern. or it sprays. subsequently, the sand processed from this acid -- a core -- a pattern is dried. after [appropriate] -- this dry sand -- a core -- although a pattern is rinsed -- this -- only -- underwater -- sand -- a core -- that a pattern is immersed **** -- sand -- a core -- a pattern is sprayed in water. then, this rinsed sand -- a core -- mineral salt processing of the pattern is carried out. The mineral salt in this case Cations, such as Li+, Na+, K+, CS+, Cu+, Cu2+, Mg2+, calcium2+, Ba2+, Zn2+, A13+, Mn2+, Fe2+, Fe3+, Co2+, nickel2+, and NH4+, What is generated in the form where anions, such as F-, Cl-, Br-, I-, NO3-, CO32-, SO42-, and PO43-, neutralize a charge is said. Na2SO4 and K2 -- CO3, MgCl2, Ba3(PO4) 2, aluminum2(SO4) 3, MnCl2 and FeSO4, and NH4NO3 grade are mentioned. [for example,] moreover, the sand obtained as mentioned above -- a core -- being immersed into a mineral salt solution like BaCl2 and aluminum2(SO4) 3 water solution, when processing a pattern by mineral salt **** -- a mineral salt solution -- sand -- a core -- carry out brush coating on the surface of a pattern, it sprays, or impalpable powder of mineral salt is sprinkled thinly.

[0009]

[Function] this invention -- setting -- first -- for example, -- said -- it carried out -- as -- RCS -- using -- sand -- a core -- that sand after molding a pattern -- a core -- ****(ing) a pattern in mineral-acid solutions, such as a rare sulfuric acid, etc. -- carrying out -- sand -- a core -- the interior of prototypal is permeated in a mineral acid -- making --

subsequently -- this sand -- a core -- a pattern is dried. in this case, the molded sand -- a core -- if a pattern (ocher) is immersed into mineral-acid solutions, such as for example, a rare sulfuric-acid solution, -- sand -- a core -- a mineral acid adheres into the prototypal surface section, or it permeates. this sand -- a core -- if it is made to dry at 80-200 degrees C for several minutes to 2 hours after pulling up a pattern from an immersion tub -- sand -- a core -- a pattern changes to dark brown. carbolic-acid system synthetic resin, such as hardening phenol resin with which this had combined the sand comrade, -- sand -- a core -- it is because it dehydrated and was carbonized by the mineral acid which adhered to the pattern or permeated. Namely, as for the hardened carbolic-acid system synthetic resin which has connected sand of each other, oxidative degradation is promoted with the heat at the time of this desiccation. Thereby, while dark-brown-izing, reinforcement also falls. The fall of this reinforcement can bear the welding pressure at the time of casting enough. the sand out of the cast taken out after casting and from the inside of metal mold when reinforcement was reduced beforehand as mentioned above, although the carbolic-acid system synthetic resin naturally hardened also heat-deteriorated with the heat of a molten metal at the time of casting -- the time of taking out a core -- sand -- a core can take out very simply easily.

[0010] the sand pass such acid treatment and desiccation -- a core, if the 1st coating agent of the shape of a slurry which becomes a pattern from the neutral water dispersing element which uses powder-like refractories as a principal component is applied this sand -- a core -- the mineral acid which exists near a prototypal front face and the front face -- the 1st coating agent -- an instant -- condensing -- this sand -- a core -- without it crawls on the surface of a pattern -- this sand -- a core, if it can coat thickly on the surface of a pattern and this is dried after that The 1st coating layer with desired homogeneous thickness is formed. by the way -- if the said slurry [which contains aluminium powder on this 1st coating layer as carried out]-like 2nd coating is performed -- sand -- a core -- the acid which remained near the prototypal front face penetrates the 1st coating layer, oozes even in the 2nd coating layer, and reacts with the aluminium powder which is a component in the 2nd coating agent. Consequently, the 2nd coating layer is bald or it separates. therefore, the sand pass said acid treatment and desiccation which were carried out -- a core -- a pattern -- for example, underwater -- for several seconds to several minutes -- being immersed -- sand -- a core -- the acid which exists near a front face is removed.

[0011] by the way, the case where acid treatment is not carried out even if it is going to apply the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component where the acid near a front face is removed -- the same -- this 1st coating agent -- sand -- a core -- it crawls on the surface of a pattern -- having -- sand -- a core -- it cannot coat thickly on the surface of a pattern. then, said sand rinsed as carried out -- a core -- a pattern is immersed into mineral salt water solutions, such as BaCl2 and aluminum2(SO4) 3 water solution, -- carrying out -- sand -- a core -- mineral salt is permeated near a prototypal front face -- making -- subsequently -- this sand -- a core -- a pattern is dried. next, the sand dried and obtained after carrying out such processing -- a core -- the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern is coated. in this case, said sand rinsed as carried out -- a core -- if it is immersed into mineral salt water solutions, such as BaCl2 water solution, before coating a pattern for example, -- sand -- a core -- mineral salt adheres or permeates the prototypal surface section. this sand -- a core -- if it is made to dry at 80-200 degrees C for several minutes to 2 hours after pulling up a pattern from an immersion tub -- sand -- a core -- the powder of mineral salt adheres to the prototypal surface section at homogeneity.

[0012] the sand pass such acid treatment, desiccation, rinsing, mineral salt processing, and desiccation -- a core -- if the 1st coating agent of the shape of a slurry which becomes a pattern from the neutral water dispersing element which uses powder-like refractories as a principal component is applied -- this sand -- a core -- the mineral salt which exists near a prototypal front face and the front face -- a coating agent -- an instant -- condensing -- this sand -- a core -- without it crawls on the surface of a pattern -- this sand -- a core -- it can coat thickly on the surface of a pattern. If this is dried after that, the 1st coating layer with desired homogeneous thickness will be formed.

[0013] thus, the sand in which the layer [1st] coating layer was made to form -- a core -- a pattern is coated with the 2nd coating agent of the shape of a slurry containing aluminium powder. Subsequently, if it is made to dry at room temperature -200 degree C for several minutes to 2 hours, the 2nd coating layer containing aluminium powder will be formed on the 1st coating layer at ** -. Thus, even if it leaves this 2nd formed coating layer in a high humidity ambient atmosphere not to mention the inside of atmospheric air, the aluminium powder of that component is not invaded by the acid any longer, and it is stability for a long period of time.

[0014] thus -- if it carries out -- shell molding -- sand -- a core -- a pattern it can harden -- sand -- a core -- powder-like refractories on the surface of a pattern The 2nd coating agent of the shape of a slurry which can coat certainly easily in the state of a request of the 1st coating agent of the shape of a slurry which consists of a neutral water

dispersing element used as a principal component, and contains aluminium powder on the 1st coating layer It can coat certainly easily in the state of a request, and, moreover, this 2nd coating layer can be maintained to stability for a long period of time.

[0015] and the sand of the collapsibility obtained by this invention -- if a core is used -- high-pressure gouy KASUTO -- like -- the time of the molten metal cast under high pressure -- sand -- without a core is damaged or a crack enters -- a molten metal -- sand -- a core -- it does not invade inside moreover, sand after a molten metal's solidifying after casting and picking out a cast product from metal mold -- the ** which hardly applies the force when collapsing a core and taking out -- sand -- while being able to collapse a core and being able to take out easily, without sand remains in the corner of a casting side -- up to all the corners -- sand -- enough -- and it can take out certainly. that is, an acid-treatment process and the continuing desiccation process -- sand -- a core -- the acid which permeated the interior dehydrating carbolic-acid system synthetic resin, such as hardening phenol resin which had combined the sand comrade, and, although carbonization decomposition is carried out Contributing, a rinsing process, and mineral salt down stream processing and the continuing desiccation process contribute the 1st coating of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component, and the 2nd coating of the shape of a slurry containing aluminium powder to making it form certainly strongly.

[0016]

[Example] sand -- a core -- when manufacturing a pattern, the resin coated sand (RCS) which coated sand with carbolic-acid system synthetic resin, such as phenol resin, is prepared first. Although RCS is manufactured with the cold method, the semi-hot method, and a dry hot process from the description of carbolic-acid system synthetic resin, such as kneading temperature and phenol resin, the field of productivity, stability, and cost to a dry hot process is desirable. That is, after carrying out fused coating of the hard resin to the sand heated by 130-160 degrees C by the mixer, when a sand-granules comrade's fixing decreases throwing only water into that of a curing agent in the case of a KISAMIN water solution and resol resin, and quenching by the latent heat of vaporization and aeration of water, in the case of novolak resin, waxes, such as calcium stearate, are distributed, and it obtains RCS of **** easy flow. In addition, those reconditioned sand is used for sand for silicon sand, a zircon sand, a chromite sand, SERABIZU, etc.

[0017] this RCS -- predetermined sand -- a core -- the approach which blows in with pressurization air into the metal mold which has the cavity of a configuration, and is called the so-called shell molding -- sand -- a core -- the pattern was cast. in this case, a core -- whenever [stoving temperature / of the metal mold for molding] -- for example, 200-300 degrees C -- desirable -- about 230-270 degrees C -- carrying out -- 30 seconds - about 2 minutes -- heating -- sand -- a core -- predetermined reinforcement was made to harden a pattern for example, sand of 20-50kg of anti-**** -- a core -- the pattern was acquired.

[0018] next, the sand which carried out in this way and was cast -- a core -- a pattern is processed in the water solution of an acid. As an acid, mineral acids, such as a sulfuric acid and phosphoric acid, are mentioned. the inside of the water solution of these acids -- sand -- a core -- a pattern -- being immersed -- sand -- a core -- stoving is carried out after making a pattern absorb. The concentration of a water solution is a less than 200-time available factor (available factor of 98% concentrated sulfuric acid and 89% phosphoric acid). if an available factor exceeds 200 times -- the sand after casting -- the collapsibility of a core falls and a treatment effect is lost. immersion time amount -- the concentration of processing liquid, and sand -- a core -- although it changes also with compatibility of a pattern and processing liquid, it is about 5 minutes from a short time for 0.5 seconds.

[0019] if -- sand -- a core -- the case where a pattern cannot get wet easily in processing liquid -- beforehand -- sand -- a core -- or it is immersed in processing liquid after carrying out short-time immersion of the pattern at hydrophilic organic solvents, such as a methanol, -- processing liquid -- the above-mentioned hydrophilic organic solvent -- sand -- a core -- after mixing until a pattern comes to get wet in processing liquid, it processes. the sand which carried out immersion processing -- a core -- prototypal stoving has so short that temperature is high time amount, ends, and is about 30 minutes at 120 degrees C as a standard. in addition, the ** which does not dilute an acid -- as it is -- you may use it -- an acid -- concentrated sulfuric acid (98%) and phosphoric acid (89%) -- like -- the case of a liquid -- sand -- a core -- what is necessary is just to ****** and to take out a pattern In order to evaporate water when the dilute solution of concentration is used like a rare sulfuric acid as described above, desiccation is required, but when not diluting with water like concentrated sulfuric acid, it is not necessary to dry. the processed sand -- a core -- although a pattern is dark-brown-ized and the anti-**** declines in proportion to processing concentration, since carbonization degradation by the acid advanced, in the case of a sulfuric acid or phosphoric acid, a strong fall is considered.

[0020] next -- above -- acid treatment and the dried sand -- a core -- a pattern is rinsed. rinsing -- said sand -- a core -- ******** is also good for underwater in a pattern -- carrying out -- said sand -- a core -- the former is easy although a pattern may be

sprayed in water -- it is certain. namely, said sand -- a core -- a pattern is taken out after being immersed in underwater [, such as tap water,] for several seconds to several minutes. this rinsed sand -- a core -- a pattern is processed in the water solution of mineral salt next, although you may dry and it is not necessary to dry. As this mineral salt, the mineral salt of BaCl2 and aluminum2(SO4) 3 grade is mentioned.

[0021] the sand rinsed in the water solution of these mineral salt -- a core -- a pattern -- being immersed -- sand -- a core -- stoving is carried out after making it absorb near a prototypal front face. The concentration of a water solution is a less than 200-time available factor. If an available factor exceeds 200 times, the coating thickness of the 1st coating agent will be thin, and a treatment effect will be lost. immersion time amount -- the concentration of processing liquid, and the rinsed sand -- a core -- although it changes also with compatibility of a pattern and processing liquid, it is about 5 minutes from a short time for 0.5 seconds. the sand which carried out immersion processing -- a core -- prototypal desiccation has so short that temperature is high time amount, ends, and is about 30 minutes at 120 degrees C as a standard. in addition, the sand which could use as it was, without diluting mineral salt, and was rinsed -- a core -- mineral salt impalpable powder is sprinkled on a pattern, and excessive mineral salt impalpable powder is wiped off. In order to evaporate water when the dilute solution of concentration is used like BaCl2 water solution as described above, desiccation is required, but when not diluting with water in this way, it is not necessary to dry.

[0022] the sand processed as mentioned above next -- a core -- the 1st coating agent is coated on the surface of a pattern. in this case, this sand -- a core -- a pattern -- the inside of the 1st coating agent -- you may be immersed -- this sand -- a core -- brush coating of the 1st coating agent may be carried out on the surface of a pattern, or you may spray. The 1st coating agent used the impalpable powder silica and the impalpable powder alumina as the principal component, and made them the slurry of 50 - 90 % of the weight of solid content which added a small amount of colloidal silica. It becomes very difficult for solid content to agitate a slurry at 50 or less % of the weight, if the thickness of the 1st coating layer becomes thin and becomes 90% of the weight or more. In addition, if pH of this 1st coating agent is not maintained to 7.0**1.0, it may precipitate and solidify also under churning.

[0023] In addition, other coating agents can also be used as the 1st coating agent. For example, what serves as about 1 - 25 % of the weight of inorganic binders, such as about 30 - 80 % of the weight of inorganic refractoriness ingredients, such as graphite, a mica, a fused silica, an alumina, a magnesia, carbon black, and zircon powder, a colloidal silica, alumina sol and clay, and an amine processing bentonite, from water may be used. In this case, more desirable things are a fused silica and a colloidal silica. In addition, the methanol and kaolin of about 10 capacity % may be added to this.

[0024] pass acid treatment, stoving, rinsing, mineral salt processing, and stoving one by one in said 1st coating agent -- the sand processed by coming -- a core -- question immersion of the pattern is carried out several seconds, and stoving is performed after that. Desiccation conditions are 120 degrees C and about 10 minutes. the case where the thickness of the 1st coating does not perform mineral salt processing -- sand -- a core, from a prototypal front face, it crawls and can hardly apply -- receiving -- enough -- thick -- moreover, sand -- a core -- there is also little osmosis in the interior of prototypal, and, moreover, the paint film is strong.

[0025] After finishing the 1st coating of the above, the 2nd coating agent of the shape of a slurry containing aluminium powder is coated. What improved 1g of octyl alcohol churning mixing as 10g of sodium dodecylbenzenesulfonate and a defoaming agent as 500g of scale-like aluminium powder and a wetting agent to 1l. of water-soluble phenol resin solutions as this 2nd coating agent 3%, for example, the thing which mixed a mica, carbon black, zircon powder, etc. to this can be used. the sand with which this 2nd coating finished said 1st coating -- a core -- that a pattern is immersed into the 2nd coating agent **** -- this sand -- a core -- it dries and forms, after carrying out brush coating of the 2nd coating agent on the surface of a pattern or spraying. Desiccation conditions are 120 degrees C and about 10 minutes.

[0026] As a still more detailed example, the example of an experiment is shown below. (The examples 1-4 of an experiment, and examples 1-4 of a comparison) RCS which coated the phenol resin (KISAMIN is included to a curing agent) of the two sections to the FURATARI sand 100 section -- using -- the sand for engine blocks with a weight of about 2kg -- a core -- two or more patterns were molded by shell molding. The die temperature of 250 degrees C, molding conditions were blown and were ** 0.8 kg/cm2, and heating time 90 seconds. sand after leaving it for one day -- a core -- prototypal anti-**** was 38kg.

[0027] Next, in the 98% concentrated-sulfuric-acid 1 section, 99 section mixing of the water was carried out the 49 sections respectively, and the water solution 50,100 times the available factor of this was prepared, respectively. this processing liquid -- sand -- a core -- the pattern was dried for 30 minutes with the 120-degree C circuit system hot blast heating furnace, after being immersed for 1 minute. It stops in this phase, and since the 1st and 2nd same coating as this example of an experiment was performed without performing the next rinsing and mineral salt processing at all, it is shown in Table 1 which carries out a postscript as examples 1 and 3 of a comparison.

subsequently, this rare vitriolization and dry sand -- a core -- it was immersed in tap water for 10 seconds, and the pattern was rinsed. Since the 1st and 2nd same coating as this example of an experiment was performed without stopping in this phase and similarly performing the next mineral salt processing at all, it is shown in Table 1 which carries out a postscript as examples 2 and 4 of a comparison.

[0028] then, this rinsed sand -- a core -- a pattern -- drawing and the MgCl21 section -- water -- each -- it dried for 30 minutes with the 120-degree C circuit system hot blast heating furnace after ******** during 1 - 2 seconds the 49 sections the 9 section in the water solution of the obtained available factor 10 which carried out 199 section mixing, and the 50,200 sections. (Examples 1-4 of an experiment)

[0029] what did not perform these rinsing processing or below (examples 1 and 3 of a comparison), the thing (examples 2 and 4 of a comparison) which did not perform mineral salt processing or below, and the sand which went to mineral salt processing and desiccation -- a core -- the pattern was dried for 10 minutes with the 120-degree C circuit system hot blast heating furnace, after being immersed in the 1st respectively same coating agent for 1 - 2 seconds. The presentation of the 1st coating agent made the impalpable powder silica 50 section and the impalpable powder alumina 30 section suspend the colloidal-silica 3 section in the water 20 section, and pH was adjusted to 7.2. the sand after desiccation -- anti-**** of a core is shown in Table 1.

[0030]

[Table 1]

	実験例				比較例			
	1	2	3	4	1	2	3	4
濃硫酸稀釈倍率	50	50	50	100	50	50	100	100
稀硫酸処理，乾燥後の抗折力(kg)	16	16	16	21	16	16	21	21
水洗	有	有	有	有	無	有	無	有
$MgCl_2$ 稀釈倍率	10	50	200	10	$MgCl_2$ 処理なし			
第1層コーティング性	良	良	やや良	良	良	不良	良	不良
第2層コートの安定性（33℃，相対湿度90%，7日後）	良	良	良	良	不良	良	不良	良
砂中子崩壊性	良	良	やや良	良	不良（焼付きが観察された）	不良	不良	不良

[0031] After finishing the 1st-layer aforementioned coating, the 2nd-layer coating was performed next. What improved 1g of octyl alcohol churning mixing as 10g of sodium dodecylbenzenesulfonate and a defoaming agent as 500g of scale-like aluminium powder and a wetting agent to 1l. of water-soluble phenol resin solutions as a coating agent of the 2nd layer 3% was used. namely, the sand which finished said 1st-layer coating -- a core -- the pattern was dried for 10 minutes with the 120-degree C circuit

system hot blast heating furnace, after being immersed for 1 - 2 seconds into this 2nd layer coating agent. the sand obtained as mentioned above -- a core -- the pattern was left for seven days in the thermo hygrostat held at the temperature of 33 degrees C, and 90% of relative humidity. The condition of the 2nd coating layer of seven days after is shown in Table 1.

[0032] the sand obtained as mentioned above -- the core was set to metal mold and high pressure casting of aluminium alloy ADC10 was carried out under 600kg/cm2 of casting pressure force, gate velocity 200 mm/Sec, and conditions with a pouring temperature of 760 degrees C. When the usual core knock out machine performed sand dropping after casting, in the case of the examples 1, 2, and 4 of an experiment, core sand was removed completely and the outstanding cast was obtained. In the case of the example 3 of an experiment, removal of core sand was a little good, but in the case of the examples 1-4 of a comparison, removal of core sand was poor. It collects and a result is shown in Table 1.

[0033]

[Effect of the Invention] thus, the resin coated sand which coated carbolic-acid system synthetic resin in this invention -- using -- sand -- a core -- with the process which molds a pattern this sand -- a core -- the process which processes a pattern from an acid, and the sand which processed from this acid -- a core -- with the process which dries a pattern this dry sand -- a core -- the process which rinses a pattern, and this rinsed sand -- a core -- with the process which processes a pattern by mineral salt the sand processed by this mineral salt -- a core -- the process which dries a pattern, and this dry sand -- a core -- with the process which coats the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern this sand coated and obtained -- the process which dries a core, and this coated sand -- with the process which coats a core with the 2nd coating agent of the shape of a slurry containing aluminium powder this sand coated and obtained -- the process which dries a core -- collapsibility sand, since the core was manufactured sand -- a core -- the time of a pattern falling even to desired reinforcement beforehand, and coating with the 1st coating agent -- the 1st coating agent -- sand -- a core -- the 1st coating layer of uniform and suitable thickness is formed, without crawling on the surface of a pattern. Moreover, when it coats with the 2nd coating agent containing aluminium powder on this 1st coating layer, the 2nd coating layer maintains a stable condition also under high humidity for a long period of time. therefore, sand -- a core bears a high-pressure cast pressure at the time of casting, and the collapsibility after casting is good.

[0034] namely, the collapsibility sand obtained by this invention -- the case where high pressure casting like die casting is performed using a core -- sand -- a core -- the time of a molten metal not inserting in inside and discharging sand from a product after casting -- sand -- easy, since the collapsibility of a core is good -- sand can be discharged certainly and completely. Of course, in the casting surface side of the product after discharging sand, sand does not remain at all but is very smooth. therefore, such sand -- in case the product which has a very complicated configuration for a core like the cooling jacket part of the cylinder crank case of for example, a closed deck mold is cast, even if it uses, working state and product satisfying enough can be obtained certainly easily.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] the collapsibility sand which has the pressure-resistant and good coating nature which uses this invention at the time of high-pressure die casting of casts which have an undercut part, such as car motor closed deck type [for example,], and collapse ease -- it is related with the manufacture approach of a core. the sand molded in more detail using the sand for shell molds -- a core, while being able to coat the 1st coating agent only at once thickly by processing a pattern by the mineral acid, rinsing subsequently and processing by mineral salt further the sand which this coat layer was strongly made even if it coated the 2nd coating agent which contains aluminium powder on it, and moreover fitted high pressure casting excellent in the collapsibility after casting -- it is related with the manufacture approach of a core. coating nature good here -- sand -- a core -- a coating agent is thin in case a pattern is coated with a coating agent -- liquefied -- sand -- a core -- sand [without permeating the interior of prototypal deeply by the extended state] -- a core -- the ** which is not

crawled from a prototypal front face -- sand -- a core -- a prototypal surface layer -- and on the whole surface predetermined thickness -- homogeneity -- and certain -- as it is formed firmly easily and it does not separate, it is that coating is carried out, and it is fully being able to bear the high-pressure cast pressure at the time of casting.

[Translation done.]

PRIOR ART

[Description of the Prior Art] the case where casts which have the undercut parts of the cylinder crank case for automobiles closed deck type [for example,] or others, such as an aluminium alloy and a Magnesium alloy, are conventionally cast and manufactured with die casting -- collapsibility sand -- carrying out die casting using a core is performed. and collapsibility sand -- the case where a core is obtained -- first -- the form of a request of sand -- hardening -- next, the hardened sand -- a core -- a prototypal front face -- a coating agent -- applying -- the time of the molten metal cast under high pressure -- sand -- that a core is damaged **** -- a molten metal -- sand -- a core -- so that it may not invade inside the ** which carries out and hardly applies the force after casting -- sand -- it is tried to collapse a core, and to enable it to take out easily, and for sand to enable it to fully take out to all the corners. of course, that case -- sand -- a core -- although how to harden a prototypal component and sand, the component of a coating agent, the method of coating, etc. are variously tried from before, the present condition is that what may fully be satisfied is not obtained. In addition, as a coating agent, the 1st coating agent which consists of powder-like refractories and a metallic oxide, the 2nd coating agent containing aluminium powder, a mica, etc. of the shape of a scale applied on the 1st coating agent, etc. are used, for example as indicated by JP,63-40639,A.

[0003] the inside of it -- sand -- hardening -- sand -- a core -- there are ** hardox process, the ** worm box method, ** shell molding, a ** cold box process, etc. as an approach of acquiring a pattern. As a hardox process, the technique indicated by JP,64-9898,B is known, for example. and this approach -- setting -- sand -- a core -- the pattern consists of a binder which uses sand, acid hardenability resin, and an oxidizer as a principal component, and is hardened with a sulfur dioxide.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] thus, the resin coated sand which coated carbolic-acid system synthetic resin in this invention -- using -- sand -- a core -- with the process which molds a pattern this sand -- a core -- the process which processes a pattern from an acid, and the sand which processed from this acid -- a core -- with the process which dries a pattern this dry sand -- a core -- the process which rinses a pattern, and this rinsed sand -- a core -- with the process which processes a pattern by mineral salt the sand processed by this mineral salt -- a core -- the process which dries a pattern, and this dry sand -- a core -- with the process which coats the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern this sand coated and obtained -- the process which dries a core, and this coated sand -- with the process which coats a core with the 2nd coating agent of the shape of a slurry containing aluminium powder this sand coated and obtained -- the process which dries a core -- collapsibility sand, since the core was manufactured sand -- a core -- the time of a pattern falling even

to desired reinforcement beforehand, and coating with the 1st coating agent -- the 1st coating agent -- sand -- a core -- the 1st coating layer of uniform and suitable thickness is formed, without crawling on the surface of a pattern. Moreover, when it coats with the 2nd coating agent containing aluminium powder on this 1st coating layer, the 2nd coating layer maintains a stable condition also under high humidity for a long period of time. therefore, sand -- a core bears a high-pressure cast pressure at the time of casting, and the collapsibility after casting is good.

[0034] namely, the collapsibility sand obtained by this invention -- the case where high pressure casting like die casting is performed using a core -- sand -- a core -- the time of a molten metal not inserting in inside and discharging sand from a product after casting -- sand -- easy, since the collapsibility of a core is good -- sand can be discharged certainly and completely. Of course, in the casting surface side of the product after discharging sand, sand does not remain at all but is very smooth. therefore, such sand -- in case the product which has a very complicated configuration for a core like the cooling jacket part of the cylinder crank case of for example, a closed deck mold is cast, even if it uses, working state and product satisfying enough can be obtained certainly easily.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] the sand molded in the desired configuration in said hardox process -- hardening -- sand -- a core -- when acquiring a pattern, it hardens using a sulfur dioxide, i.e., a sulfur dioxide. Therefore, in order to use a sulfur dioxide, work environment is bad and use of gas which has a bad influence on the body is not liked at the works in Japan. moreover -- even if it uses a sulfur dioxide, in order not to have a bad influence on the body but to make it not worsen work environment, either -- installation of the ancillary facility for it -- very much -- coming out -- it is -- moreover, the installation and operation sake -- law -- regulation is also received.

[0005] Therefore, this invention person decided to improve the goodness of the shell molding which uses a binder instead of an oxidizer and a sulfur dioxide. shell molding -- the mixture of sand and a binder -- hardening -- sand -- a core -- the resin coated sand (RCS) which did not use a sulfur dioxide for acquiring a pattern, but coated carbolic-acid system synthetic resin, such as phenol resin, beforehand -- sand -- a core -- into the metal mold for pattern molding, it blows in by the compressed air, heat hardening is carried out, and it molds. however, the same coating agent as the coating agent currently performed quite good with said hardox process in this case -- sand -- a core -- even if applied to the pattern, it will crawl without a coating agent getting wet, and did not work.

[0006] on the other hand -- the artificer of the invention in this application -- RCS -- using -- shell molding -- using -- sand -- a core -- a pattern -- molding -- this sand -- a core -- the sand which dried it after processing a pattern by mineral acids, such as a rare sulfuric acid and phosphoric acid, -- a core -- coating the coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern, and drying it -- collapsibility sand -- patent application of the approach of obtaining a core was invented and carried out. the collapsibility sand obtained by this approach -- although a core is effective as it is -- the collapsibility sand of the molten metal at the time of high-pressure gouy KASUTO -- in order to lose the push in to a core more certainly, this coating was used as the 1st coating layer, and it tried to coat that front face with the 2nd coating agent containing aluminium powder as shown in said JP,63-40639,A carried out. However, good coating was not obtained in this combination. namely, sand -- a core -- the acid which remained near the prototypal front face penetrates the 1st coating layer, oozes even in the 2nd coating layer, and reacts with the aluminium powder which is a component in the 2nd coating agent. Consequently, the 2nd coating layer is bald or it separates.

[Translation done.]

MEANS

[Means for Solving the Problem] this invention -- setting -- RCS -- using -- sand -- a core -- the process which molds a pattern, and this sand -- a core -- with the process which processes a pattern from an acid the sand processed from this acid -- a core -- the process which dries a pattern, and this dry sand -- a core -- with the process which rinses a pattern this rinsed sand -- a core -- the process which processes a pattern by mineral salt, and the sand which processed by this mineral salt -- a core -- with the process which dries a pattern this dry sand -- a core -- with the process which coats the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern this sand coated and obtained -- the process which dries a core, and this coated sand -- the process which coats a core with the 2nd coating agent of the shape of a slurry containing aluminium powder, and this sand coated and obtained -- the process which dries a core -- collapsibility sand -- a core is obtained.

[0008] sand -- a core -- as an acid which processes a pattern, mineral acids, such as a sulfuric acid and phosphoric acid, are used, for example. moreover, sand -- a core -- being immersed into an acidic solution like a rare sulfuric acid, when processing a pattern from an acid **** -- an acidic solution -- sand -- a core -- brush coating is carried out on the surface of a pattern, or it sprays. subsequently, the sand processed from this acid -- a core -- a pattern is dried. after [appropriate] -- this dry sand -- a core -- although a pattern is rinsed -- this -- only -- underwater -- sand -- a core -- that a pattern is immersed **** -- sand -- a core -- a pattern is sprayed in water. then, this rinsed sand -- a core -- mineral salt processing of the pattern is carried out. The mineral salt in this case Cations, such as Li+, Na+, K+, CS+, Cu+, Cu2+, Mg2+, calcium2+, Ba2+, Zn2+, A13+, Mn2+, Fe2+, Fe3+, Co2+, nickel2+, and NH4+, What is generated in the form where anions, such as F-, Cl-, Br-, I-, NO3-, CO32-, SO42-, and PO43-, neutralize a charge is said. Na2SO4 and K2 -- CO3, MgCl2, Ba3(PO4) 2, aluminum2(SO4) 3, MnCl2 and FeSO4, and NH4NO3 grade are mentioned. [for example,] moreover, the sand obtained as mentioned above -- a core -- being immersed into a mineral salt solution like BaCl2 and aluminum2(SO4) 3 water solution, when processing a pattern by mineral salt **** -- a mineral salt solution -- sand -- a core -- carry out brush coating on the surface of a pattern, it sprays, or impalpable powder of mineral salt is sprinkled thinly.
[0009]

[Translation done.]

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OPERATION

[Function] this invention -- setting -- first -- for example, -- said -- it carried out -- as -- RCS -- using -- sand -- a core -- that sand after molding a pattern -- a core -- ****(ing) a pattern in mineral-acid solutions, such as a rare sulfuric acid, etc. -- carrying out -- sand -- a core -- the interior of prototypal is permeated in a mineral acid -- making -- subsequently -- this sand -- a core -- a pattern is dried. in this case, the molded sand -- a core -- if a pattern (ocher) is immersed into mineral-acid solutions, such as for example, a rare sulfuric-acid solution, -- sand -- a core -- a mineral acid adheres into the prototypal surface section, or it permeates. this sand -- a core -- if it is made to dry at 80-200 degrees C for several minutes to 2 hours after pulling up a pattern from an immersion tub -- sand -- a core -- a pattern changes to dark brown. carbolic-acid system synthetic resin, such as hardening phenol resin with which this had combined the sand comrade, -- sand -- a core -- it is because it dehydrated and was carbonized by the mineral acid which adhered to the pattern or permeated. Namely, as for the hardened carbolic-acid system synthetic resin which has connected sand of each other, oxidative degradation is promoted with the heat at the time of this desiccation. Thereby, while

dark-brown-izing, reinforcement also falls. The fall of this reinforcement can bear the welding pressure at the time of casting enough. the sand out of the cast taken out after casting and from the inside of metal mold when reinforcement was reduced beforehand as mentioned above, although the carbolic-acid system synthetic resin naturally hardened also heat-deteriorated with the heat of a molten metal at the time of casting -- the time of taking out a core -- sand -- a core can take out very simply easily.

[0010] the sand pass such acid treatment and desiccation -- a core, if the 1st coating agent of the shape of a slurry which becomes a pattern from the neutral water dispersing element which uses powder-like refractories as a principal component is applied this sand -- a core -- the mineral acid which exists near a prototypal front face and the front face -- the 1st coating agent -- an instant -- condensing -- this sand -- a core -- without it crawls on the surface of a pattern -- this sand -- a core, if it can coat thickly on the surface of a pattern and this is dried after that The 1st coating layer with desired homogeneous thickness is formed. by the way -- if the said slurry [which contains aluminium powder on this 1st coating layer as carried out]-like 2nd coating is performed -- sand -- a core -- the acid which remained near the prototypal front face penetrates the 1st coating layer, oozes even in the 2nd coating layer, and reacts with the aluminium powder which is a component in the 2nd coating agent. Consequently, the 2nd coating layer is bald or it separates. therefore, the sand pass said acid treatment and desiccation which were carried out -- a core -- a pattern -- for example, underwater -- for several seconds to several minutes -- being immersed -- sand -- a core -- the acid which exists near a front face is removed.

[0011] by the way, the case where acid treatment is not carried out even if it is going to apply the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component where the acid near a front face is removed -- the same -- this 1st coating agent -- sand -- a core -- it crawls on the surface of a pattern -- having -- sand -- a core -- it cannot coat thickly on the surface of a pattern. then, said sand rinsed as carried out -- a core -- a pattern is immersed into mineral salt water solutions, such as BaCl2 and aluminum2(SO4) 3 water solution, -- carrying out -- sand -- a core -- mineral salt is permeated near a prototypal front face -- making -- subsequently -- this sand -- a core -- a pattern is dried. next, the sand dried and obtained after carrying out such processing -- a core -- the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component on the surface of a pattern is coated. in this case, said sand rinsed as carried out -- a core -- if it is immersed into mineral salt water solutions, such as BaCl2 water solution, before coating a pattern for example, -- sand -- a core -- mineral salt adheres or permeates the prototypal surface section. this sand -- a core -- if it is made to dry at 80-200 degrees C for several minutes to 2 hours after pulling up a pattern from an immersion tub -- sand -- a core -- the powder of mineral salt adheres to the prototypal surface section at homogeneity.

[0012] the sand pass such acid treatment, desiccation, rinsing, mineral salt processing, and desiccation -- a core -- if the 1st coating agent of the shape of a slurry which becomes a pattern from the neutral water dispersing element which uses powder-like refractories as a principal component is applied -- this sand -- a core -- the mineral salt which exists near a prototypal front face and the front face -- a coating agent -- an instant -- condensing -- this sand -- a core -- without it crawls on the surface of a pattern -- this sand -- a core -- it can coat thickly on the surface of a pattern. If this is dried after that, the 1st coating layer with desired homogeneous thickness will be formed.

[0013] thus, the sand in which the layer [1st] coating layer was made to form -- a core -- a pattern is coated with the 2nd coating agent of the shape of a slurry containing aluminium powder. Subsequently, if it is made to dry at room temperature -200 degree C for several minutes to 2 hours, the 2nd coating layer containing aluminium powder will be formed on the 1st coating layer at ** -. Thus, even if it leaves this 2nd formed coating layer in a high humidity ambient atmosphere not to mention the inside of atmospheric air, the aluminium powder of that component is not invaded by the acid any longer, and it is stability for a long period of time.

[0014] thus -- if it carries out -- shell molding -- sand -- a core -- a pattern it can harden -- sand -- a core -- powder-like refractories on the surface of a pattern The 2nd coating agent of the shape of a slurry which can coat certainly easily in the state of a request of the 1st coating agent of the shape of a slurry which consists of a neutral water dispersing element used as a principal component, and contains aluminium powder on the 1st coating layer It can coat certainly easily in the state of a request, and, moreover, this 2nd coating layer can be maintained to stability for a long period of time.

[0015] and the sand of the collapsibility obtained by this invention -- if a core is used -- high-pressure gouy KASUTO -- like -- the time of the molten metal cast under high pressure -- sand -- without a core is damaged or a crack enters -- a molten metal -- sand -- a core -- it does not invade inside moreover, sand after a molten metal's solidifying after casting and picking out a cast product from metal mold -- the ** which hardly applies the force when collapsing a core and taking out -- sand -- while being able to collapse a core and being able to take out easily, without sand remains in the corner of a casting side -- up to all the corners -- sand -- enough -- and it can take out certainly. that

is, an acid-treatment process and the continuing desiccation process -- sand -- a core -- the acid which permeated the interior dehydrating carbolic-acid system synthetic resin, such as hardening phenol resin which had combined the sand comrade, and, although carbonization decomposition is carried out Contributing, a rinsing process, and mineral salt down stream processing and the continuing desiccation process contribute the 1st coating of the shape of a slurry which consists of a neutral water dispersing element which uses powder-like refractories as a principal component, and the 2nd coating of the shape of a slurry containing aluminium powder to making it form certainly strongly.

[Translation done.]

EXAMPLE

[Example] sand -- a core -- when manufacturing a pattern, the resin coated sand (RCS) which coated sand with carbolic-acid system synthetic resin, such as phenol resin, is prepared first. Although RCS is manufactured with the cold method, the semi-hot method, and a dry hot process from the description of carbolic-acid system synthetic resin, such as kneading temperature and phenol resin, the field of productivity, stability, and cost to a dry hot process is desirable. That is, after carrying out fused coating of the hard resin to the sand heated by 130-160 degrees C by the mixer, when a sand-granules comrade's fixing decreases throwing only water into that of a curing agent in the case of a KISAMIN water solution and resol resin, and quenching by the latent heat of vaporization and aeration of water, in the case of novolak resin, waxes, such as calcium stearate, are distributed, and it obtains RCS of **** easy flow. In addition, those reconditioned sand is used for sand for silicon sand, a zircon sand, a chromite sand, SERABIZU, etc.

[0017] this RCS -- predetermined sand -- a core -- the approach which blows in with pressurization air into the metal mold which has the cavity of a configuration, and is called the so-called shell molding -- sand -- a core -- the pattern was cast. in this case, a core -- whenever [stoving temperature / of the metal mold for molding] -- for example, 200-300 degrees C -- desirable -- about 230-270 degrees C -- carrying out -- 30 seconds - about 2 minutes -- heating -- sand -- a core -- predetermined reinforcement was made to harden a pattern for example, sand of 20-50kg of anti-**** -- a core -- the pattern was acquired.

[0018] next, the sand which carried out in this way and was cast -- a core -- a pattern is processed in the water solution of an acid. As an acid, mineral acids, such as a sulfuric acid and phosphoric acid, are mentioned. the inside of the water solution of these acids -- sand -- a core -- a pattern -- being immersed -- sand -- a core -- stoving is carried out after making a pattern absorb. The concentration of a water solution is a less than 200-time available factor (available factor of 98% concentrated sulfuric acid and 89% phosphoric acid). if an available factor exceeds 200 times -- the sand after casting -- the collapsibility of a core falls and a treatment effect is lost. immersion time amount -- the concentration of processing liquid, and sand -- a core -- although it changes also with compatibility of a pattern and processing liquid, it is about 5 minutes from a short time for 0.5 seconds.

[0019] if -- sand -- a core -- the case where a pattern cannot get wet easily in processing liquid -- beforehand -- sand -- a core -- or it is immersed in processing liquid after carrying out short-time immersion of the pattern at hydrophilic organic solvents, such as a methanol, -- processing liquid -- the above-mentioned hydrophilic organic solvent -- sand -- a core -- after mixing until a pattern comes to get wet in processing liquid, it processes. the sand which carried out immersion processing -- a core -- prototypal stoving has so short that temperature is high time amount, ends, and is about 30 minutes at 120 degrees C as a standard. in addition, the ** which does not dilute an acid -- as it is -- you may use it -- an acid -- concentrated sulfuric acid (98%) and phosphoric acid (89%) -- like -- the case of a liquid -- sand -- a core -- what is necessary is just to ****** and to take out a pattern In order to evaporate water when the dilute solution of concentration is used like a rare sulfuric acid as described above, desiccation is required, but when not diluting with water like concentrated sulfuric acid, it is not necessary to dry. the processed sand -- a core -- although a pattern is dark-brown-ized

and the anti-**** declines in proportion to processing concentration, since carbonization degradation by the acid advanced, in the case of a sulfuric acid or phosphoric acid, a strong fall is considered.

[0020] next -- above -- acid treatment and the dried sand -- a core -- a pattern is rinsed. rinsing -- said sand -- a core -- ******** is also good for underwater in a pattern -- carrying out -- said sand -- a core -- the former is easy although a pattern may be sprayed in water -- it is certain. namely, said sand -- a core -- a pattern is taken out after being immersed in underwater [, such as tap water,] for several seconds to several minutes. this rinsed sand -- a core -- a pattern is processed in the water solution of mineral salt next, although you may dry and it is not necessary to dry. As this mineral salt, the mineral salt of BaCl2 and aluminum2(SO4) 3 grade is mentioned.

[0021] the sand rinsed in the water solution of these mineral salt -- a core -- a pattern -- being immersed -- sand -- a core -- stoving is carried out after making it absorb near a prototypal front face. The concentration of a water solution is a less than 200-time available factor. If an available factor exceeds 200 times, the coating thickness of the 1st coating agent will be thin, and a treatment effect will be lost. immersion time amount -- the concentration of processing liquid, and the rinsed sand -- a core -- although it changes also with compatibility of a pattern and processing liquid, it is about 5 minutes from a short time for 0.5 seconds. the sand which carried out immersion processing -- a core -- prototypal desiccation has so short that temperature is high time amount, ends, and is about 30 minutes at 120 degrees C as a standard. in addition, the sand which could use as it was, without diluting mineral salt, and was rinsed -- a core -- mineral salt impalpable powder is sprinkled on a pattern, and excessive mineral salt impalpable powder is wiped off. In order to evaporate water when the dilute solution of concentration is used like BaCl2 water solution as described above, desiccation is required, but when not diluting with water in this way, it is not necessary to dry.

[0022] the sand processed as mentioned above next -- a core -- the 1st coating agent is coated on the surface of a pattern. in this case, this sand -- a core -- a pattern -- the inside of the 1st coating agent -- you may be immersed -- this sand -- a core -- brush coating of the 1st coating agent may be carried out on the surface of a pattern, or you may spray. The 1st coating agent used the impalpable powder silica and the impalpable powder alumina as the principal component, and made them the slurry of 50 - 90 % of the weight of solid content which added a small amount of colloidal silica. It becomes very difficult for solid content to agitate a slurry at 50 or less % of the weight, if the thickness of the 1st coating layer becomes thin and becomes 90% of the weight or more. In addition, if pH of this 1st coating agent is not maintained to 7.0**1.0, it may precipitate and solidify also under churning.

[0023] In addition, other coating agents can also be used as the 1st coating agent. For example, what serves as about 1 - 25 % of the weight of inorganic binders, such as about 30 - 80 % of the weight of inorganic refractoriness ingredients, such as graphite, a mica, a fused silica, an alumina, a magnesia, carbon black, and zircon powder, a colloidal silica, alumina sol and clay, and an amine processing bentonite, from water may be used. In this case, more desirable things are a fused silica and a colloidal silica. In addition, the methanol and kaolin of about 10 capacity % may be added to this.

[0024] pass acid treatment, stoving, rinsing, mineral salt processing, and stoving one by one in said 1st coating agent -- the sand processed by coming -- a core -- question immersion of the pattern is carried out several seconds, and stoving is performed after that. Desiccation conditions are 120 degrees C and about 10 minutes. the case where the thickness of the 1st coating does not perform mineral salt processing -- sand -- a core, from a prototypal front face, it crawls and can hardly apply -- receiving -- enough -- thick -- moreover, sand -- a core -- there is also little osmosis in the interior of prototypal, and, moreover, the paint film is strong.

[0025] After finishing the 1st coating of the above, the 2nd coating agent of the shape of a slurry containing aluminium powder is coated. What improved 1g of octyl alcohol churning mixing as 10g of sodium dodecylbenzenesulfonate and a defoaming agent as 500g of scale-like aluminium powder and a wetting agent to 1l. of water-soluble phenol resin solutions as this 2nd coating agent 3%, for example, the thing which mixed a mica, carbon black, zircon powder, etc. to this can be used. the sand with which this 2nd coating finished said 1st coating -- a core -- that a pattern is immersed into the 2nd coating agent **** -- this sand -- a core -- it dries and forms, after carrying out brush coating of the 2nd coating agent on the surface of a pattern or spraying. Desiccation conditions are 120 degrees C and about 10 minutes.

[0026] As a still more detailed example, the example of an experiment is shown below. (The examples 1-4 of an experiment, and examples 1-4 of a comparison) RCS which coated the phenol resin (KISAMIN is included to a curing agent) of the two sections to the FURATARI sand 100 section -- using -- the sand for engine blocks with a weight of about 2kg -- a core -- two or more patterns were molded by shell molding. The die temperature of 250 degrees C, molding conditions were blown and were ** 0.8 kg/cm2, and heating time 90 seconds. sand after leaving it for one day -- a core -- prototypal anti-**** was 38kg.

[0027] Next, in the 98% concentrated-sulfuric-acid 1 section, 99 section mixing of the water was carried out the 49 sections respectively, and the water solution 50,100 times

the available factor of this was prepared, respectively. this processing liquid -- sand -- a core -- the pattern was dried for 30 minutes with the 120-degree C circuit system hot blast heating furnace, after being immersed for 1 minute. It stops in this phase, and since the 1st and 2nd same coating as this example of an experiment was performed without performing the next rinsing and mineral salt processing at all, it is shown in Table 1 which carries out a postscript as examples 1 and 3 of a comparison. subsequently, this rare vitriolization and dry sand -- a core -- it was immersed in tap water for 10 seconds, and the pattern was rinsed. Since the 1st and 2nd same coating as this example of an experiment was performed without stopping in this phase and similarly performing the next mineral salt processing at all, it is shown in Table 1 which carries out a postscript as examples 2 and 4 of a comparison.

[0028] then, this rinsed sand -- a core -- a pattern -- drawing and the MgCl21 section -- water -- each -- it dried for 30 minutes with the 120-degree C circuit system hot blast heating furnace after ******** during 1 - 2 seconds the 49 sections the 9 section in the water solution of the obtained available factor 10 which carried out 199 section mixing, and the 50,200 sections. (Examples 1-4 of an experiment)

[0029] what did not perform these rinsing processing or below (examples 1 and 3 of a comparison), the thing (examples 2 and 4 of a comparison) which did not perform mineral salt processing or below, and the sand which went to mineral salt processing and desiccation -- a core -- the pattern was dried for 10 minutes with the 120-degree C circuit system hot blast heating furnace, after being immersed in the 1st respectively same coating agent for 1 - 2 seconds. The presentation of the 1st coating agent made the impalpable powder silica 50 section and the impalpable powder alumina 30 section suspend the colloidal-silica 3 section in the water 20 section, and pH was adjusted to 7.2. the sand after desiccation -- anti-**** of a core is shown in Table 1.

[0030]

[Table 1]

	実験例				比較例			
	1	2	3	4	1	2	3	4
濃硫酸稀釈倍率	50	50	50	100	50	50	100	100
稀硫酸処理，乾燥後の抗折力(kg)	16	16	16	21	16	16	21	21
水洗	有	有	有	有	無	有	無	有
$MgCl_2$ 稀釈倍率	10	50	200	10	$MgCl_2$ 処理なし			
第1層コーティング性	良	良	ﾔﾔ良	良	良	不良	良	不良
第2層コートの安定性（33℃，相対湿度90%，7日後）	良	良	良	良	不良	良	不良	良
砂中子崩壊性	良	良	ﾔﾔ良	良	不良	不良	不良	不良
					（焼付きが観察された）			

[0031] After finishing the 1st-layer aforementioned coating, the 2nd-layer coating was performed next. What improved 1g of octyl alcohol churning mixing as 10g of sodium dodecylbenzenesulfonate and a defoaming agent as 500g of scale-like aluminium powder and a wetting agent to 1l. of water-soluble phenol resin solutions as a coating agent of the 2nd layer 3% was used. namely, the sand which finished said 1st-layer

coating -- a core -- the pattern was dried for 10 minutes with the 120-degree C circuit system hot blast heating furnace, after being immersed for 1 - 2 seconds into this 2nd layer coating agent. the sand obtained as mentioned above -- a core -- the pattern was left for seven days in the thermo hygrostat held at the temperature of 33 degrees C, and 90% of relative humidity. The condition of the 2nd coating layer of seven days after is shown in Table 1.

[0032] the sand obtained as mentioned above -- the core was set to metal mold and high pressure casting of aluminium alloy ADC10 was carried out under 600kg/cm2 of casting pressure force, gate velocity 200 mm/Sec, and conditions with a pouring temperature of 760 degrees C. When the usual core knock out machine performed sand dropping after casting, in the case of the examples 1, 2, and 4 of an experiment, core sand was removed completely and the outstanding cast was obtained. In the case of the example 3 of an experiment, removal of core sand was a little good, but in the case of the examples 1-4 of a comparison, removal of core sand was poor. It collects and a result is shown in Table 1.

[Translation done.]